

REMARKS

Claims 1-40 are pending in this application, of which claims 16-40 are withdrawn from consideration.

Claim 1 has been amended to include a limitation of the amount of polymer produced in the first polymerization stage (I) in order to more clearly distinguish the subject matter of the present invention with respect to the prior art cited by the Examiner. The support for the amendment can be found in the specification as originally filed (page 8, lines 1-2) and in Examples 1-13 (from page 29, line 19 to page 38, line 11).

Claim Rejections

Rejection Under 35 U.S.C. § 103

A. Response to the Rejection of Claims 1-15 under 35 U.S.C. § 103(a) as being unpatentable over Vaughan et al. in view of Sacchetti et al.

In response to the rejection of claims 1-15 under 35 U.S.C. § 103(a) as being unpatentable over International Application No. WO 97/48736 by Vaughan et al. ("Vaughan") in view of US Patent No. 5,759,940 by Sacchetti et al ("Sacchetti"), Applicants respectfully submit that the claimed invention as amended is patentably distinct from the prior art cited, and respectfully traverse the rejection.

The present invention relates to a multi-stage process for the polymerization of olefins carried out in two sequential polymerization steps (I) and (III), the first one being carried out in the presence of a Ziegler-Natta catalyst, the second one being carried out in the presence of a late transition metal catalyst. The claimed process has the following technical features:

- (i) a first polymerization stage using a Ziegler-Natta Ti or V catalyst to prepare an olefinic polymer with a particular porosity range;
- (ii) a second polymerization stage, carried out in the presence of the obtained porous polymer on which a late transition metal catalyst is supported;
- (iii) the polymer produced in the first polymerization stage is at least 10% by weight relative to the total polymer prepared in the entire process.

Vaughan teaches the use of late transition metal complexes as catalyst components for the olefin polymerization. It is known from Vaughan that said catalyst components may be used either unsupported in a homogeneous polymerization or, alternatively, supported on inorganic carriers, such as SiO₂ or Al₂O₃. Nevertheless, as clearly disclosed in the present application at page 4, lines 8-13, "the supportation on silica and alumina of late transition metal catalyst leads to lower catalytic activities in comparison with homogeneous polymerization reactions. Moreover, the supportation causes a substantial decrease of the branch-producing tendencies (branches/1000 carbon atoms) of these catalysts, thus leading to polymers having greater melting points and lower processability".

Therefore, the technical problem to be solved by the present invention (see page 4, lines 14-17) is to obviate the above drawbacks by providing a process for the olefin polymerization having an increased catalytic activity with respect to the activities exerted in homogeneous polymerizations as well as in heterogeneous systems in which silica or alumina was used as the support for the catalysts. The solution as provided by the present invention is to use the polymerization process outlined above with the technical features (i), (ii) and (iii).

Vaughan did not provide any useful suggestions for a skilled artisan to solve the technical problem (lower catalytic activity and decrease of the branching tendency) involved by the supportation of late transition metal catalysts on silica and alumina due to the following reasons:

- A) It does not disclose the technical feature (i) of the present invention, which requires an olefinic polymer with a particular porosity is prepared by means of a Ziegler-Natta catalyst in the first stage polymerization;
- B) It does not give any particular motivation or incentive to use a porous polymer as the catalyst support of late transition metal catalysts as disclosed in the present invention as technical feature (ii) discussed above;

- C) It does not deal with a sequential polymerization process, thus this prior art document cannot provide any indication regarding the technical feature (iii) of the present invention.

Sacchetti discloses the preparation of catalyst components for the polymerization of olefins, said components being obtained by a first polymerization stage using a Ziegler-Natta Ti or V catalyst to prepare an olefinic prepolymer, and then the obtained prepolymer is contacted with a metallocene catalyst component.

Even with knowledge of Sacchetti, a skilled artisan would not have arrived at the solution claimed in the present application due to the following reasons:

- A) Sacchetti does not teach the technical feature (ii) of the present invention, which requires to carry out the second polymerization step by means of late transition metal catalysts as defined in the present application;
- B) Sacchetti completely teaches away from the process feature (iii) of the present invention, since in Sacchetti, only a minimal amount of a prepolymer obtained from the first polymerization step is used to support the catalyst for the second stage polymerization, while in the present invention the amount of polymer obtained in the first step is of at least 10% by weight.

Specifically, Sacchetti teaches the use of a prepolymer as a support for the catalyst with the amount of prepolymer far below the 10% by weight of the total polymer produced. All of the Examples in Sacchetti (Examples 1-23) show a small amount of the prepolymer support, the largest one being Example 16, in which the prepolymer content is 0.2% by weight ($0.05/25=0.2\%$).

In contrast, the Examples of the present invention show the amount of polymer produced in the first step is always higher than 10% by weight, mostly around 50%. Therefore, the final product of the claimed process is substantially a blend of the two polymers produced in the sequential polymerization steps.

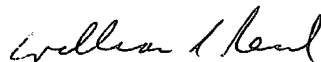
In view of the above, the disclosure and the Examples in Sacchetti completely teach away from the technical feature (iii) of the present invention as claimed in the amended Claim 1, thus this limiting feature (iii) further strengthens the inventiveness of the claimed process.

Reconsideration and withdrawal of the Rejection respectfully is requested.

Applicants respectfully request that a timely Notice of Allowance be issued in this case. Should the Examiner have questions or comments regarding this application or this amendment, Applicants' attorney would welcome the opportunity to discuss the case with the Examiner.

The Commissioner is hereby authorized to charge U.S. PTO Deposit Account 08-2336 for the fee specified under 37 C.F.R. § 1.17(e) and in the amount of any additional fee required for consideration of this amendment and Request for Continued Examination.

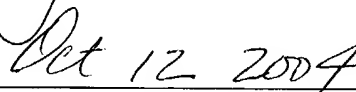
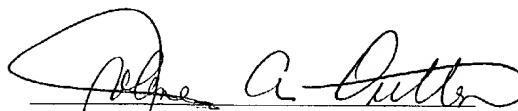
Respectfully submitted,



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